

Research Article

# Relationship between the Level of Spirituality and Blood Pressure Control among Adult Hypertensive Patients in a Southwestern Community in Nigeria

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## Abstract

**Background:** Spirituality has been strongly associated with good blood pressure control as it forms a strong coping mechanism in hypertensive patients. This hospital-based cross-sectional study was done to determine the relationship between spirituality and blood pressure control among adult hypertensive patients in rural Southwestern Nigeria to achieve good blood pressure control.

**Method:** The selection was done by systematic random sampling technique. Socio-demographic and clinical information were obtained through semi-structured interviewer-administered questionnaires. The level of spirituality was assessed using the Spiritual Perspective Scale. Data were analysed using the Statistical Package for Social Sciences version 20.0. Statistical significance was set at  $p \leq 0.05$ .

**Results:** The mean age of the respondents was  $61.1 \pm 11.1$  years. More than half (52.6%) had a high level of spirituality and more than two-thirds (67.1%) of respondents had controlled blood pressure. Respondents with a high level of spirituality were 4.76 times more likely to have good blood pressure control ( $p < 0.001$ , 95% CI {1.05-14.99}) than those with a low level of spirituality.

**Conclusion:** Proper understanding and effective utilization of this relationship will assist health professionals and researchers in the appropriate integration of this concept into patients' holistic care with the aim of achieving better blood pressure control among hypertensive patients.

## Introduction

Hypertension and its associated complications have become a common and important global public health challenge of the 21<sup>st</sup> century [1-3]. Hypertension is a major risk factor and a powerful predictor of cardiovascular morbidity and mortality [1,4]. The global prevalence of hypertension has been increasing. For instance, in the year 2000, the world was estimated to have close to 1 billion people with hypertension with a prevalence rate of 26.4% and this has been projected to increase to 1.56 billion affected individuals with a prevalence rate of 29.2% in 2025, the population burden being greater in developing countries [2,5]. In Africa, blood pressure control rates were uniformly low and often did not exceed 45% of the hypertensive population [6]. A hospital-based study in Port-Harcourt, Nigeria shows that good hypertension control

could only be achieved for just 24.2% of the patients seen in the clinic [7]. According to a community-based study among an urban population in Zaria, Nigeria the hypertension control rate was only 12.4% among patients who have been on antihypertensive medications for over 3 months [8]. These gloomy statistics call for urgent action, especially as the WHO has projected a further 24% increase in the prevalence of non-communicable diseases in Nigeria, in the next 10 years [6]. Worldwide, there has been a systematic introduction of the concept of spirituality into the medical field with a growing interest in the possible health benefits as a result of having a spiritual belief and following a religious lifestyle [9].

Spirituality can be defined as "the aspect of humanity that refers to the way individuals seek and express meaning and purpose and the way they experience their connectedness to

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**Keywords:** Spirituality; Blood pressure control; Hypertension



the moment, to self, to others, to nature, and the significant or sacred” [10] Spirituality has been found to play vital roles in health through disease detection and treatment compliance, beliefs that conflict with medical care, medical decision making and spiritual struggles that create stress and impair health outcome [11]. Specifically, it has been noted as an essential factor influencing the health-related quality of life of chronically ill patients due to its integration into positive thoughts and health behaviors, as well as healthy coping styles which alleviate the perceived overwhelming persistent situation [12,13].

Spirituality has been associated with good blood pressure control in hypertensive patients [14]. The importance of addressing spirituality in hypertension like in other chronic diseases is indicated in several studies [8,13,15]. Spirituality is important to hypertensive patients, and some patients have indicated that they use their spirituality for coping and disease management [16]. In a study conducted by Kretchy, et al. [8] findings revealed that participants with a high level of spirituality and religious participation had significantly lower diastolic and systolic blood pressure than their counterparts with a low level of spirituality (77.8 vs. 84.7 mmHg and 137.2 vs. 149.5 mmHg, respectively) after adjusting for demographic, sociocultural, and psychological variables [8]. Studies have also revealed that people who engaged in spiritual activities had lower levels of cortisol (a biological marker of stress) attenuation of neural responses to stress responsivity, regulation of emotion during exposure to stress, prevention and reduction of stress-related psychopathology, good lipid profiles, good glucose control, and a functional immune system [16-18]. There is a paucity of studies on the relationship between spirituality and blood pressure control in Nigeria.

This study is designed to determine the role of spirituality in the control of blood pressure among adult hypertensive patients

## Materials and methods

### Study area/study design/population

The hospital-based descriptive cross-sectional study was conducted among adult hypertensive patients aged 18 years and above attending the Family Medicine Clinic of Federal Teaching Hospital, Ido-Ekiti (FETHI) in rural Southwest Nigeria. The study was conducted over sixteen (16) weeks from April to July 2017 during which a total of 1,986 hypertensive patients were encountered.

### Sample size determination

The sample size was calculated using the formula for estimating proportions in a cross-sectional study:  $n = z^2 pq/d^2$  (For population > 10,000) [19] and  $nf = n/1 + (n/N)$  (For population < 10,000) [19].

Where:

$n$  = the minimum sample size when the population is more than 10,000.

$nf$  = the minimum sample size when the population is less than 10,000.

$N$  = the estimate of study population size in a given year, i.e. adult hypertensive patients who attended the Family Medicine Clinic of Federal Teaching Hospital in 2015. ( $N = 4,800$ ).

$z_{\alpha}$  = the level of confidence (The standard normal deviation set at 1.96 which corresponds to the 95% confidence level obtained from the standard statistical table of normal distribution.

$p$  = Estimated prevalence of medication adherence among hypertensive patients in a given population, (using 37.2%, which was the prevalence of hypertension among hypertensive patients at a tertiary hospital, in rural Southeast Nigeria) [20].

$q = 1 - p$ .

$d$  = Degree of accuracy desired usually set at 0.05

The minimum sample size was 334 respondents. However, to allow for non-responses during recruitment, a non-response value of 10% (33) was added to the minimum sample size ( $nf$ ). This gave a minimum sample size of 367 respondents. Hence, 367 respondents were used for the study.

A sampling frame was built, by sorting out the case files of hypertensive patients attending the clinic for the day (Figure 1).

Participants who met the inclusion and exclusion criteria on each clinic day were assigned numbers from 1 up to the last number for the day.

The sampling interval ( $K$ ) was calculated using the formula [19]:

$$K = N/n$$

(Where:  $N$  = total number of patients,  $n$  = calculated minimum sample size and  $K$  = sampling interval) [19].

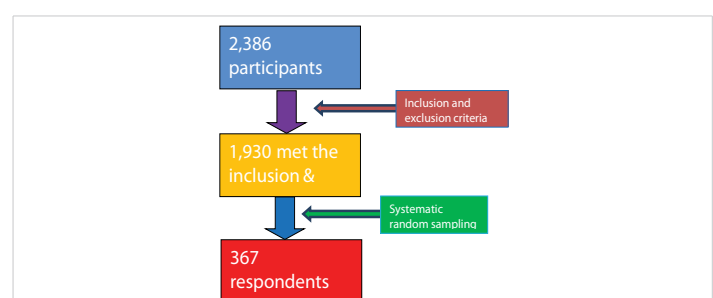


Figure 1: Study flowchart.



Hence  $K = 1930/367 = 5.26$  which is approximately 5.

A systematic random sampling technique was then used to select the participants on each clinic day; hence, every 6<sup>th</sup> consenting hypertensive patient who met the inclusion criteria was enrolled for this research. Therefore, an average of five (5) hypertensive patients was recruited per day.

To ensure that a patient was not selected twice, a register for all patients that participated in the study was opened, using their hospital numbers and a colour tag on their file jackets.

### Inclusion criteria

1. All consenting adult hypertensive patients aged 18 years and above.
2. Patients who have been diagnosed and on treatments for hypertension for at least 3 months in the clinic and had recorded a minimum of three (3) consecutive clinic visits in the last six months before recruitment to ensure familiarity with diagnosis and prescribed treatment modalities.

### Exclusion criteria

1. Patients with co-morbidity (Chronic Kidney Disease, Diabetes)
2. Critically ill patient as at the time of the study (Hypertensive emergency, Congestive cardiac failure, Cerebrovascular accident).
3. Pregnant hypertensive patients belong entirely to another class of hypertension.

### Data collection and instruments

Socio-demographic variables were obtained using a semi-structured interviewer-administered questionnaire. Clinical parameters (including BP) of respondents were measured, recorded, and graded by the researcher.

Assessment of patients' level of Spirituality was done using the Spiritual perspective scale (SPS). It is a 10-item tool designed to measure the extent to which individuals hold certain spiritual beliefs and engage in spiritually related behaviors [21,22]. It was scored using the mean [21,22]. The mean spirituality score for this study was  $40.9 \pm 15.2$ . The scoring and determination of the level of spirituality are found below (section 3.9.3.3.1) [23]. Scores within 10-35 indicated a low level of spirituality and those ranging between 36-60 indicated a high level of spirituality. Using Cronbach's alpha, reliability has consistently been rated above 0.90 and average inter-item correlations are 0.878 [8,16,22]. The SPS has been used successfully in prior African studies [9,23].

### Scoring and determination of the level of spirituality

Ten items are measuring the beliefs and behaviors of respondents on a 6-point Likert scale [21,22].

The minimum and maximum obtainable scores were 10 and 60 respectively.

Range = minimum possible score – maximum possible score.

Number of expected outcomes = Respondents' level of spirituality dichotomized into high or low. i.e. 2 divisions

For this study, respondents' level of spirituality is dichotomized into high or low.

This gives a range of  $60-10 = 50$

Interval = Range (50)

The number of expected outcomes (2). Interval is 25

Therefore

10 to 35 (minimum score + interval) is a low level of spirituality

36 to 60 is a high level of spirituality

Assessment of Blood Pressure was measured with an Accoson<sup>®</sup> brand mercury sphygmomanometer.

For this study, a cut-off level of both < 140 mmHg and < 90 mmHg for SBP and DBP respectively were considered Controlled BP. Uncontrolled BP was considered when the SBP and DBP were  $\geq 140$  mmHg and  $\geq 90$  mmHg respectively using the recommendation of Eight Reports of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-VIII) criteria [24].

### Data analysis

All data collected were analyzed using the Statistical Package for Social Sciences (SPSS) for Windows software version 20 (SPSS Inc., Chicago, IL, USA) [25]. The data were presented in tabular form, graphs, and charts as appropriate. Frequency tables and charts were generated for relevant variables. Means, standard deviations, and percentages were determined as appropriate. The means, median, and standard deviation were calculated for continuous variables while categorical variables were analyzed using proportions. The Pearson's chi-square test was used to assess the bivariate association between spirituality with the respondents' socio-demographic characteristics and blood pressure control and the Fisher's exact test was used in analyzing variables with cells less than 5 counts. Binary logistic regression analysis was used to assess the association between the independent variable (spirituality) and dependent variable (blood pressure control) while adjusting for the socio-demographic characteristics. A *p* - value of equal or less than 0.05 was taken to be statistically significant.

### Ethical clearance and consent

Ethical approval was obtained from the Ethics and Research



Committee of Federal Teaching Hospital, Ido-Ekiti (Protocol Number: ERC/2016/02/25/08A). Informed verbal consent was obtained from the willing participants. To maintain confidentiality, no names appeared on the questionnaires, but only numbers were used as identifiers. The reporting of this study conforms to the strengthening of the Reporting of Observational Studies in Epidemiology (STROBE) statement [26]. All patients' details have been de-identified.

## Results

### Characteristics of respondents

A total of 367 respondents participated in the study. The respondent's ages ranged between 18 and 82 years, their mean age was  $61.1 \pm 11.1$  years and the majority (58.0%) were older adults (65-82 years). The majority of respondents were female (53.7%) and were married (76.0%), Christians (78.7%), and rural dwellers (64.6%) from the Yoruba tribe (74.7%). Most respondents were traders (37.6%) who had a primary level of education (31.9%) and earned incomes below the poverty line (57.8%). The details of the respondent's socio-demographic characteristics are shown in Table 1.

Table 2 shows the Spiritual perspective scale based on the spiritual behaviors and beliefs of respondents. Spiritual behaviors that contributed significantly to the high level of spirituality in this study were: private prayers/meditations ( $\chi^2 = 3.42$ ,  $SD = 0.97$ ) and spiritual discussions with family and friends ( $\chi^2 = 3.19$ ,  $SD = 0.92$ ), while Spiritual beliefs that contributed significantly to the high level of spirituality in this study were: forgiveness ( $\chi^2 = 3.27$ ,  $SD = 0.74$ ), seeking spiritual guidance before making decisions ( $\chi^2 = 3.26$ ,  $SD = 0.87$ ) and regarding spirituality as a means of finding live meaning and solving life's puzzle ( $\chi^2 = 3.26$ ,  $SD = 0.64$ ).

Table 3 shows the level of spirituality among the respondents. More than half (52.6%) of the respondents had a high level of spirituality while 47.4% had a low level of spirituality. The mean spirituality score obtained was  $40.9 \pm 15.2$ .

Figure 2 A bar chart showing the level of blood pressure control among the respondents. More than two-thirds (67.1%) of the respondents had controlled blood pressure while 32.9% had uncontrolled blood pressure

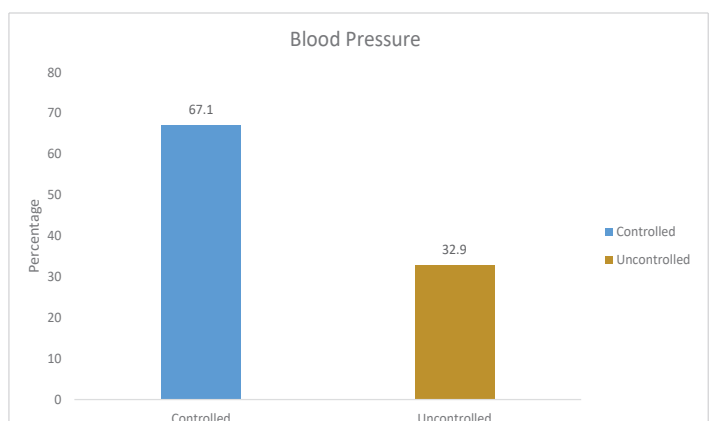
Table 4 shows the relationship between spirituality and blood pressure among the respondents. It showed that Blood pressure control improves with increasing spirituality. More than two-thirds (69.9%) of those with a high level of spirituality also had good blood pressure control. The relationship was statistically significant as  $p < 0.05$ .

Table 5 shows the relationships between the socio-demographic characteristics of respondents and their level of spirituality. Older adult (64.5%), female (67.5%), married (58.4%), Christian (56.4%), Yoruba (62.8%) and urban

**Table 1:** Socio-demographic Characteristics of Respondents.

Variable	Frequency (n = 367)	Percentage (%)
Age (years)	61.1 ± 11.1	
Young Adult (18-35)	7	2.0
Middle-Aged Adult (36-64)	147	40.0
Older Adult (65-82)	213	58.0
Sex		
Male	170	46.3
Female	197	53.7
Marital Status		
Single	12	3.3
Married	279	76.0
Divorced/Separated	52	14.2
Widowed	24	6.5
Religion		
Christianity	289	78.7
Islam	71	19.3
Traditionalist	7	2.0
Domicile		
Urban	130	35.4
Rural	237	64.6
Ethnicity		
Yoruba	274	74.7
Igbo	55	15.0
Hausa	32	8.7
Others	6	1.6
Educational Level		
None	46	12.5
Primary	117	31.9
Secondary	76	20.7
Tertiary	106	28.9
Post Graduate	22	6.0
Occupation		
Professionals	73	19.9
Trading	138	37.6
Farming	81	22.1
Retiree	39	10.6
Self – Employed	36	9.8
Income*		
< Poverty Line (< ₦20,520)	212	57.8
≥ Poverty Line (≥ ₦20,520)	155	42.2

₦20,520 is the expected minimum income per month equivalent to \$1.90 per day at \$1 equals ₦360 (as of July 5, 2017) [41]



**Figure 2:** A graphical representation of the level of Blood Pressure Control among Respondents.



**Table 2a:** Spiritual Perspective Scale.

S/N	SPS (Spiritual Behaviours)	Not at all	Less than once a year	About once a year	About once a month	About once a week	About once a day	Σ F	Mean	Standard Deviation
1	In talking with family and friends, how often do you mention spirituality?	5	12	19	42	123	166	367	3.19	0.92
2	How often do you share with others the problems and joys of living according to your spiritual beliefs?	12	13	12	65	123	142	367	3.08	1.10
3	How often do you read spiritually-related material?	17	18	24	60	111	137	367	2.95	1.11
4	How often do you engage in private prayer and meditation?	11	12	7	43	58	236	367	3.42	0.97

**Table 2b**

S/N	SPS (Spiritual Beliefs)	Strongly Disagree	Disagree	Disagree more than agree	Agree more than disagree	Agree	Strongly Agree	Σ F	Mean	Standard Deviation
5	Forgiveness is an important part of my spirituality.	6	9	12	13	186	141	367	3.27	0.74
6	I seek spiritual guidance in making decisions in my everyday life.	6	23	24	29	153	132	367	3.26	0.87
7	My spirituality is a significant part of my life.	6	23	33	37	145	123	367	3.25	0.88
8	I frequently feel very close to God or a "higher power" in prayer, during public worship, or at important moments in my daily life.	2	23	39	23	159	121	367	3.24	0.80
9	My spiritual views have had an influence upon influenced my life.	6	12	40	30	157	122	367	3.30	0.77
10	My spirituality is especially important to me because it answers many questions about the meaning of life.	2	8	25	38	182	112	367	3.26	0.64

**Table 3:** Assessment of the Level of Spirituality among the Respondents.

Variable	Frequency n = 367	Percentage (%)
<b>Spirituality Perspective Scale</b>		
Low (10-35)	174	47.4
High (36-60)	193	52.6
Total	367	100.0
Mean Spirituality Score ± SD	40.9 ± 15.2	

**Table 4:** Relationships between Blood Pressure Control and Spirituality among the Respondents.

Variable	Spirituality			χ <sup>2</sup>	p - value
	Low (10-35) (%) n = 174	High (36-60) (%) n = 193	Total N=367		
Blood pressure control					
Uncontrolled (≥140/90 mmHg)	100 (82.6)	21 (17.4)	121 (100)	75.88	< 0.001
Controlled (< 140/90 mmHg)	74 (30.1)	172 (69.9)	246 (100)		

dwelling (55.1%) respondents had high levels of spirituality. Also, respondents that had a tertiary level of education (70.8%) who are retired (61.5%), and earned below the poverty line (75.4%) had a high level of spirituality. All variables were statistically significant with  $p < 0.05$  except the area of domicile.

Table 6 explains how some socio-demographic characteristics predicted the level of spirituality. Respondents who were middle-aged adults (1.54 times), Married (7.54 times), Christians (3.38 times), Yoruba (2.23 times), Postgraduate (2.70 times), Professionals (3.54), Less than 5 years on antihypertensive drug (2.72), Controlled blood pressure (4.76 times) and were on 2 drugs or less (2.80 times) were more likely to have a high level of spirituality. However,

respondents who were male gender (0.71 times), farmers (0.78), and earned income below the poverty line (0.74 times) were less likely to have high medication adherence.

## Discussion

### Socio-demographic characteristics of respondents

The socio-demographic profile of the respondents showed that the majority of the respondents were above 65 years. This was higher than reported in a similar hospital-based study in Port-Harcourt by Akpa. et al. [7] and Azinge, et al. in Lagos [27]. It was however lower than the mean age found in an international survey [28]. The reason for the higher preponderance of hypertension in the older age group found in this study compared to other studies might be because this study was done in a rural population as this usually consists of older age groups due to rural-to-urban migration of the young age groups. However, Ido-Ekiti town is a non-industrialized semi-urban setting surrounded by rural settlements.

The majority of the respondents {197 (53.7%)} in this study were females. This aligned with the findings of Iloh, et al. (65.2%) [29] Who also reported a higher prevalence of hypertension in females. It is worthy of note that women are protected from most cardiovascular events compared to men, until after menopause, during which women are at increased risk of cardiovascular complications compared to premenopausal women [30]. Gender differences in blood pressure are inconsistent in many population studies, while some studies quoted a higher prevalence of hypertension among males [30,31], others reported no significant gender difference [32,33]. These inconsistencies could be a result of different age populations or the methodology used in these studies.



**Table 5:** Relationships between the Level of Spirituality and Sociodemographic Characteristics of Respondents.

Variable	Spirituality			χ <sup>2</sup>	p - value
	Low (%) n = 174	High (%) n = 193	Total N = 367		
<b>Age (years)</b>					
Young Adult (18-35)	5 (71.4)	2 (28.6)	7 (100)		0.004‡
Middle-Aged Adult (36-64)	93 (63.7)	53 (36.3)	146 (100)		
Older Adult (65-82)	76 (35.5)	138(64.5)	214 (100)		
<b>Sex</b>					
Male	110 (64.7)	60 (35.3)	170 (100)	31.09	< 0.001
Female	64 (32.5)	133 (67.5)	197 (100)		
<b>Marital Status</b>					
Single	12 (100.0)	0 (0.0)	12 (100)		0.001‡
Married	116 (41.6)	163 (58.4)	279 (100)		
Divorced	18 (75.0)	6 (25.0)	24 (100)		
Separated	17 (60.7)	11 (39.3)	28 (100)		
Widowed	11 (45.8)	13 (54.2)	24 (100)		
<b>Religion</b>					
Christianity	126 (43.6)	163 (56.4)	289 (100)		0.018‡
Islam	45 (62.5)	27 (37.5)	72 (100)		
Traditionalist	5 (71.4)	2 (28.6)	7 (100)		
<b>Domicile</b>					
Urban	106 (44.9)	130 (55.1)	236 (100)	1.35	0.245
Rural	68 (51.9)	63 (48.1)	131 (100)		
<b>Ethnicity</b>					
Yoruba	102 (37.2)	172 (62.8)	274 (100)		< 0.001‡
Igbo	47 (85.5)	8 (14.5)	55 (100)		
Hausa	22 (68.8)	10 (31.2)	32 (100)		
Others	4 (66.7)	2 (33.3)	6 (100)		
<b>Educational Status</b>					
None	29 (63.0)	17 (37.0)	46 (100)	21.57	< 0.001
Primary	69 (59.0)	48 (41.0)	117 (100)		
Secondary	37 (48.7)	39 (51.3)	76 (100)		
Tertiary	31 (29.2)	75 (70.8)	106 (100)		
Post Graduate	7 (33.3)	14 (66.7)	21 (100)		
<b>Occupation</b>					
Professionals	35 (43.8)	45 (56.2)	80 (100)	13.43	0.009
Trading	71 (47.7)	78 (52.3)	149 (100)		
Farming	63 (68.5)	29 (31.5)	92 (100)		
Self Employed	27 (61.4)	17 (38.6)	44 (100)		
Retired	15 (38.5)	24 (61.5)	39 (100)		
<b>Income</b>					
< Poverty Line	52 (24.6)	159 (75.4)	211 (100)	85.96	< 0.001
≥ Poverty Line	122 (78.2)	34 (21.8)	156 (100)		

‡ = Fisher's Exact Test

In this study about two-thirds {279 (76%)} of all the respondents were married. This was similar to findings by Marfo, et al, [34] who reported 74% married hypertensive patients. However, findings in this study were higher than the 66.4% reported in Ibadan by Ekore, et al. [35]. This difference may be due to the variation in marriage culture in different states and regions among the study populations in Nigeria. Less than a quarter of the population had formal education. This might be due to the study area which is located in the South-Western part of the country where there is a high literacy level which might influence patients' health-seeking behaviour in terms of them presenting in the hospital for the management of their disease. This study confirms the rating of Ekiti State as an educationally advantaged state. The

**Table 6:** Logistics Regression for Predictors of Spirituality among the Respondents.

Variable	OR	95% CI		p - value	
		Lower	Upper		
Age group	Young Adult (18-35)	0.54	0.53	2.68	0.051
	Middle-Aged Adult (36-65)	1.54	1.05	8.42	0.003
	Older Adult (> 65)	1.0 (RC)			
Sex	Male	0.71	0.04	0.90	0.021
	Female	1.0 (RC)			
Religion	Christianity	3.38	1.22	10.81	0.004
	Islam	1.11	1.08	3.29	0.031
	Traditionalist	1.0 (RC)			
Ethnicity	Yoruba	2.23	1.19	9.41	0.011
	Igbo	1.53	1.04	2.92	0.016
	Hausa	1.10	0.03	3.05	0.062
	Others	1.0 (RC)			
Education	None	1.0 (RC)			
	Primary	1.55	0.13	6.93	0.051
	Secondary	1.11	1.04	7.42	0.012
	Tertiary	2.13	1.67	10.54	0.037
	Postgraduate	2.70	1.08	9.93	0.030
Occupation	Professionals	3.54	1.04	9.47	0.022
	Trading	1.21	1.02	6.21	0.004
	Farming	0.78	0.09	0.99	0.016
	Self – Employed	3.02	1.98	9.83	0.039
	Retired	1.0 (RC)			
Income	< Poverty Line	0.74	0.10	0.97	0.006
	> Poverty Line	1.0 (RC)			
Blood Pressure	Controlled	4.76	1.05	14.99	< 0.001
	Uncontrolled	1.0 (RC)			

OR: Odds Ratio; RC: Repeatability Coefficient

reported level of literacy was much higher in a hospital-based study done among young adults in Ibadan, South-western Nigeria where about 79.1% of respondents had a minimum of secondary school education [36] and 40.0% reported in Lagos among market women [37]. These differences may be due to the different study populations among whom the studies were conducted.

### Level of spirituality among respondents

In Table 3, this study shows that more than half of the respondents had a high level of spirituality. The finding of the majority of the respondents being highly spiritual in this study may not be unconnected with the cultural practices that were inherent in Nigeria. This was similar to a study by Ibraheem, et al. [36] on the relationship between self-reported health status and spirituality among adult patients in Ibadan, Nigeria who found a 51% level of spirituality. In contrast, Jeri and Lynda reported a 100% spirituality level among Nigerians living in America [38]. This is higher than that obtained in the present study, and the difference may be due to the different study populations among whom the studies were conducted and the method used in the study.

In Table 2 Spiritual behaviors that contributed significantly



to the high level of spirituality in this study according to Table 3 were private prayers/meditations and spiritual discussions with family and friends. Also, Spiritual beliefs that contributed significantly to the high level of spirituality in this study were forgiveness, seeking spiritual guidance before making decisions, and spirituality as a means of finding meaning to live and solving life's puzzle.

### Relationship between spirituality and blood pressure control

This study shows a significant relationship between spirituality and blood pressure control. This is similar to the finding in a study done on spirituality and blood pressure control by Kretchy, et al. [8] in Umuahia, Nigeria, which showed that participants with a high level of spirituality had a significantly lower diastolic and systolic blood pressure than their counterparts with a low level of spirituality after adjusting for demographic, sociocultural, and psychological variables. High spirituality was found to positively influence the decision by patients to adhere strictly to their antihypertensive medications, therefore, leading to good BP control. However, the findings in this study are higher than what was observed by Quingtao, et al, [39] in a study conducted in China where it was found that 53.4% of those who had a high level of spirituality also had good blood pressure control.

Also, logistic regression shows that for a single unit increase in the level of spirituality, hypertensive patients were almost five times more likely to achieve good blood pressure control. Hence, a high level of spirituality is a significant predictor of good blood pressure control among hypertensive patients.

### Relationship between spirituality and sociodemographic characteristics of respondents

In this study, spirituality levels increased with age, and specifically, more than half of the older age group had a higher level of spirituality. This could be a result of the fact that, as people get older, they tend to find solace and meaning in life in the transcendent and hence tend to have more inclination toward spirituality. The above finding is in agreement with hospital-based research conducted by Ibraheem, et al. [36] who also reported an increased level of spirituality with age.

This study established the fact that women have higher spirituality than men. This is possibly due to the vulnerability of women in this part of the world and women tend to find solace in their spiritual practices. This is also similar to what Jeri, et al. [38] found in their study. A higher spirituality score was found among the respondents who were married when compared with the respondents who were single or divorced and this difference was statistically significant. This might be due to the possible encouragement by the spouse towards spirituality, which is not found among the single and the divorced. This trend is in agreement with the finding of Ibraheem, et al. [36] in their study on the relationship between self-reported health status and spirituality among adult

patients attending the general outpatient clinic of a tertiary hospital in Ibadan where he reported a higher spirituality level among married people compared with those who were not married [36].

It was observed in this study that spirituality increased with an increase in the level of literacy and this was statistically significant. This might be due to the high literacy level found in a large proportion of the respondents in this study. This is different from the previous finding of Silva, et al. [40] who reported that people of low socio-economic class tend to be more spiritual and that the prevalence of spiritual commitment tends to drop off among higher-income categories.

### Recommendations

- Physicians should take appropriate spiritual history while managing patients with hypertension.
- Physicians should encourage their health facilities to have Chaplains and Imams that patients can be referred to for spiritual assistance when needed.
- Physicians should understand their limits by not imposing any form of spiritual practices but rather encourage the practice of what they believe in, in the process of integrating spirituality into their patient's care.
- Participants with uncontrolled BP should be appropriately referred and encouraged on regular and lifelong use of their antihypertensives to avert devastating vascular complications.

### Limitations of the study

1. The study is a cross-sectional study done in a tertiary health institution; the findings may not apply to the general population.
2. Subjects' ambulatory or home blood pressure readings in out-of-clinic settings were not monitored in this study, and thus the determination of optimal blood pressure control was based on clinic-based measurement alone instead of an average over some time. It is known that the office BP recordings are higher than the home-based recordings. Therefore, those diagnosed with systemic hypertension might have been unnecessarily exposed to antihypertensives with the attendant hypotensive effects and drug intolerance.
3. Spirituality is a dynamic and continuous variable. The dichotomisation in this study represented the levels of spirituality (high or low) at the time of gathering the data. This might not reflect the enduring relationship with a chronic condition like hypertension.

### Conclusion

This study has shown that spirituality has a direct influence on blood pressure control among adult hypertensive patients



in rural Southwestern, Nigeria. These associations provide direction for future studies that will aid in understanding how health professionals can use this information to provide culturally sensitive and patient-centered care that will improve blood pressure control among patients with hypertension.

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## Availability of data and materials

The datasets for this study would be made available from the correspondence author on a reasonable request.

## Authors' contribution

1. AO - Conceptualization of the study, designed the study protocol, data acquisition and analysis, and drafted the initial manuscript
2. PO - Literature review, data analysis, and review of manuscript for intellectual content.
3. AOI - Critically revised the protocol for methodological and intellectual content.

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